The Spatial Mismatch of Unemployment and Jobs in Ramsey County

Prepared by:

Zhuo Chen, Ryan Mercurio, & Corrin Bemis

Students in GEOG5564: Urban Geographic Information Science & Analysis
Instructor: Dr. Ying Song
Department of Geography, Environment & Society
College of Liberal Arts

Prepared in Collaboration with:
Max Holdhusen
Senior Policy Analyst
Policy and Planning Department
Ramsey County

RAMSEY COUNTY

Resilient Communities Project
University of Minnesota
Building community-university partnerships for sustainability

The project on which this report is based was completed in collaboration with Ramsey County as part of the 2018–2019 Resilient Communities Project (RCP) partnership. RCP is a program at the University of Minnesota's Center for Urban and Regional Affairs (CURA) that connects University faculty and students with Minnesota communities to address strategic projects that advance local resilience and sustainability.

The contents of this report represent the views of the authors, and do not necessarily reflect those of RCP, CURA, the Regents of the University of Minnesota, or Ramsey County.

This publication may be available in alternate formats upon request.

Resilient Communities Project
University of Minnesota
330 HHHSPA
301—19th Avenue South
Minneapolis, Minnesota 55455
Phone: (612) 625-7501
E-mail: rcp@umn.edu
Web site: http://www.rcp.umn.edu

Resilient Communities Project
University of Minnesota
Building Community-University Partnerships for Resilience

The Spatial Mismatch of Unemployment and Jobs in Ramsey County

Zhuo Chen, Ryan Mercurio, and Corrin Bemis

Introduction

The suburbanization of postwar American cities occurred as middle- and upper-class Americans, usually white, left cities for peripheral suburbs. At the same time that people were fleeing the city, jobs were too. In general, the second half of the 20th century saw a trend of economic decentralization at the level of the metropolitan area.[1] Meanwhile, those remaining in the city generally did not have the resources to move and/or had limited mobility due to discrimination. As core cities lost more and more of their economic hegemony over metropolitan areas, it began (or rather, continued) to be difficult for the inner-city residents to find employment. This is the crux of the "spatial mismatch hypothesis:" there is a geographic separation between the unemployed and the job openings that they seek. Due to the assumed limited mobility of the unemployed, it is theorized that this spatial mismatch serves to reinforce the high unemployment rates found in core cities.

The spatial mismatch phenomenon was probably first described in the scholarly literature by John F Kain, a Harvard economist, in a 1968 article titled "Housing segregation, Negro unemployment, and metropolitan decentralization."[2] The article used the idea of spatial mismatch to explain the Watts riots of 1965. Over the span of the next few decades, a series of empirical studies generally found proof of spatial mismatch, with this research generally following Kain's lead, focusing on the distance between "entry-level" job openings and "unskilled," unemployed black residents of the inner city.[3] However, throughout the 1980s and 90s the field became a sort of theoretical battleground between those who believed in the crucial importance of spatial mismatch and opponents who argued that the distance away from job openings was a minor detail in the plight of the unemployed black urban worker. These citics of spatial mismatch tend to highlight continuing patterns of segregation, discrimination, and gaps in educational quality between wealthy suburbs and poor urban neighborhoods, which some have collectively termed "racial mismatch."[4] More recently, some on either side of the issue have apparently reformed under the compromise that spatial mismatch is a real phenomenon, even if it is far from the only reason for the continued poverty of inner cities in America.[5]

While a direct study of spatial mismatch will necessarily compare the spatial distribution of job openings to the spatial distribution of unemployed workers, these datasets are difficult to obtain and manage for various reasons. It is a simpler task to study spatial mismatch *indirectly*. For instance, an indirect approach might closely examine the situation of currently-employed workers in the study area. For those who have found work, how far away is it, and in what sector are they employed? Although answering these questions does not concretely inform us that spatial mismatch is present or absent, we can begin to draw conclusions about the nature of unemployment through examining the characteristics of employment in the same area.

The current project is an attempt to use US Census data to indirectly explore spatial mismatch as it currently exists in Ramsey County, Minnesota. Following a more explicit statement of our objectives, we discuss our analysis methods and the materials used in the study. The 'Results' section demonstrates

our findings in detail. The report concludes with a section exploring the implications of our findings and suggests directions for further research.

Objectives

There are two main objectives of our study. Our first objective is to identify the areas in Ramsey County with the highest unemployment rates and attach a general demographic profile to these areas. The spatial mismatch hypothesis assumes that high-unemployment areas are occupied by low-mobility, low-income, racial minorities living in the core city; we will test the validity of this assumption.

Our second objective is to map employment status and commute time in Ramsey County, linking employment sector and income with commute time to see if inner-city workers tend to work further from home and if certain employment sectors require additional travel. The Spatial Mismatch Hypothesis suggests that people living in the urban core do not have sufficient access to peripheral employment, but that this peripheral employment is critical to those communities all the same. We will examine the extent to which this core-to-periphery "reverse commute" exists in Ramsey County.

Data and Methods

Virtually all of the data used in this study is attributable to the US Census Bureau and is publicly available. We collected the demographics and employment data for the 400 block groups of Ramsey County using the National Historical GIS (NHGIS) web service.[6] This dataset consists of estimates produced by the American Community Survey (ACS) series in the years 2013-2017. The ACS is a recurring survey of the American public undertaken by the US Census Bureau). The survey collects information on income, lifestyle, race, education, employment, and commuting characteristics.

Data on places of employment also comes from the Census Bureau and is publicly available. This 'microdata' (consisting of individual workers, not spatially aggregated) is published by the bureau's Center for Economic Studies (CES) and is referred to as LODES (Longitudinal Origin-Destination Employment Statistics). We used the CES web service OnTheMap[7] to collect the employment locations of all the workers in Ramsey County (which are associated broadly with the worker's age, income, employment sector, and commute distance). Finally, map layers for water bodies and road networks were downloaded from the Minnesota Geospatial Commons.[8]

To map this data and fulfill our research objectives, we used ESRI's ArcGIS software. In the case of characterizing high-unemployment areas, the 67 block groups in Ramsey County which averaged greater than 10% unemployment in the period 2013-2017 are identified for further analysis. We then compare the spatial distribution of these high-unemployment block groups to those with high rates of poverty and racial minorities as well as those with low rates of high school graduation and motor vehicle ownership. Non-spatially, we compare the employment characteristics (income, sector, and commute distance) of workers living in the high-unemployment areas to workers living in other areas of Ramsey County. For our second objective, we map travel time to work, income, the homes of workers by industrial sector, and workplaces all by block group in Ramsey County. We include raw cross-tabulations as an alternative analysis tool.

Results

The first goal of this project is to identify those areas within Ramsey County which have high unemployment rates, and provide a general profile for these areas. As stated above, the enumeration units for this study are the county's 400 block groups as defined by the US Census Bureau. Block groups typically have about 1000 residents, and the size of a particular group depends chiefly on its population density.

Where are the areas with the most unemployment located? There are two statistics available at the block group level which may be considered for this question - total unemployment and unemployment rate. The two statistics tell different stories, and both are notable. Figure 1 maps both. Unemployment rate is represented by the color of the block group. All of the colored block groups have a higher unemployment rate than the county average of 5%; the darker the color, the higher the unemployment rate. Meanwhile, each dot represents the approximate location of 25 unemployed workers. The density of the dots indicates the spatial concentration of unemployment; thus, the parts of the map with the most dots show where the most unemployed people live, regardless of what the unemployment rate is. The most concerning area on the map, red-colored and dot-heavy, is a narrow band running from west to east across the city of St. Paul. The band generally follows the I-94 corridor from the west, then continues just north of the capitol and downtown, and then follows Maryland Avenue through the East Side, before finally turning northeast towards North St. Paul.

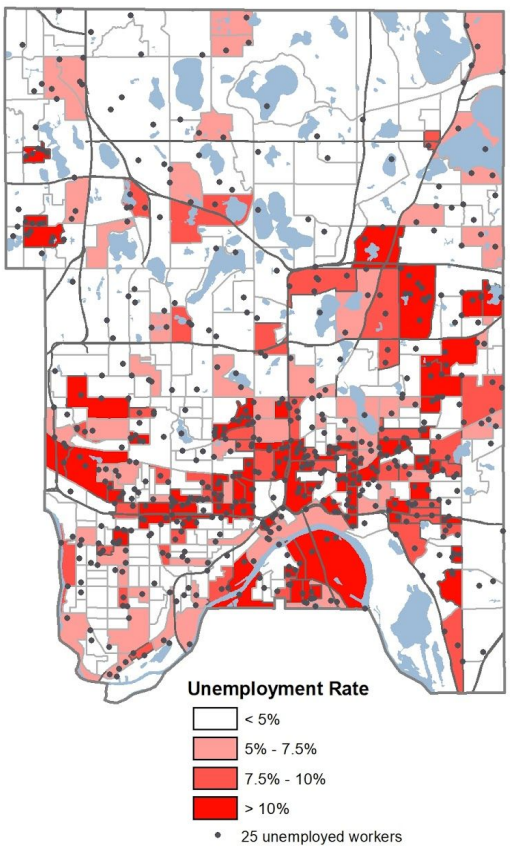


Figure 1. Unemployment

What are the neighborhood demographics most associated with unemployment? According to the spatial mismatch hypothesis, it should be poor neighborhoods in the urban core in which residents lack the mobility to work long distances away. We have already seen that unemployment is clustered around the urban core. Figure 2 demonstrates the other two characteristics - poverty and immobility. In Figures 2 and 3, the locations of the 67 block groups with greater than 10% unemployment - twice the county average - are overlaid on maps of poverty and zero-vehicle households. The map on the left shows a very high correlation between poverty rate and unemployment rate, since the outlined high-unemployment areas also tend to be areas with higher poverty rates. The map on the right shows that there is also correlation between unemployment and zero-vehicle households, especially on the west side along the University Avenue Green Line corridor.

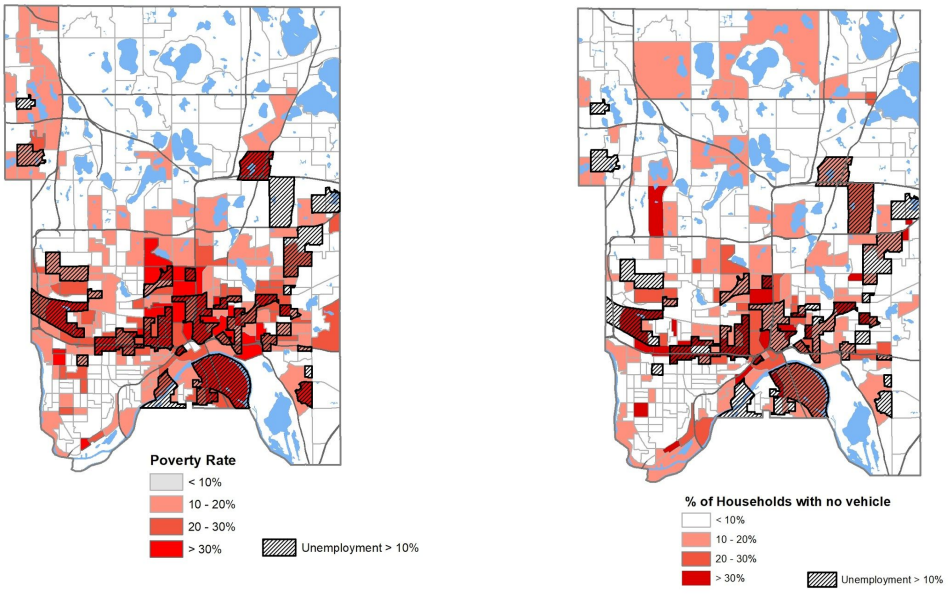


Figure 2. Poverty, Mobility, and Employment

Apart from its assumptions about poverty and mobility, the spatial mismatch hypothesis should also consider other factors, such as race and education. Race is important because, as the critics of spatial mismatch argue, it is a possible confounding factor when attempting to attribute high unemployment rates to poverty and immobility. Education is also necessary to consider, since the amount of education a person has received is a barrier to entry for certain jobs and industries, especially professional services, finance, and business administration, which tend to be the job sectors that remain clustered in the urban core. Figure 3 shows the relationship between race, education, and unemployment. As we might expect, there is a high correlation among the three. In the block groups with the highest unemployment, it is typical for less than 75% of the population to be white, and for more than 10% of adults to have no high school diploma.

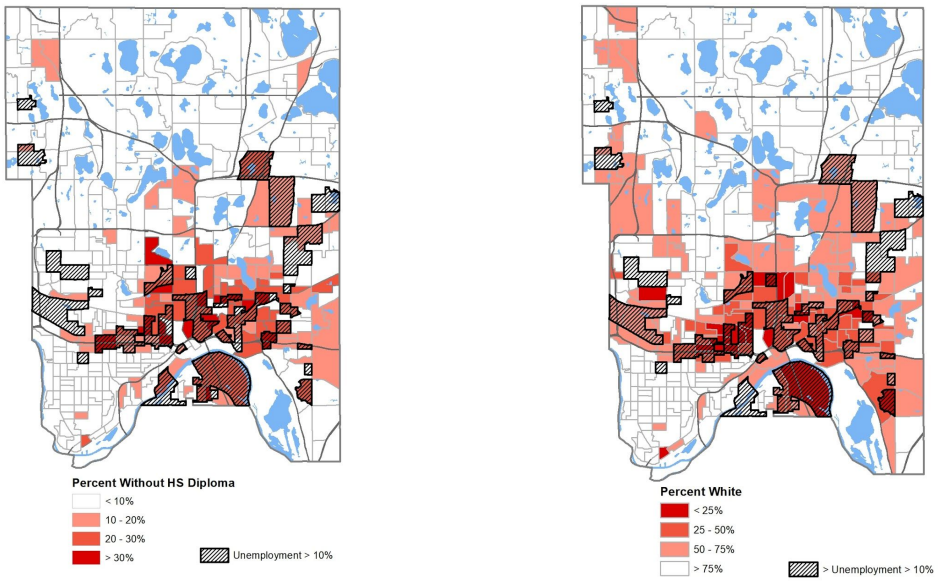


Figure 3: Education,Race, and Unemployment

Finally, we can also briefly develop a characterization of the employed workers living in the high-unemployment block groups. The three tables below compare the workers residing in the 67 block groups with greater than 10% unemployment with Ramsey County workers as a whole. In Table 1, it is immediately clear that employed workers in high-unemployment areas tend to earn less than others in Ramsey County. Far less than half of these workers earn $40,000 or more per year. Tables 2 and 3 compare the length of the commute. No differences stand out in these tables; in fact, the commute length is very similar, in both miles and minutes, regardless of whether the worker lives in a high unemployment area or not. This commuter-parity may be surprising, since the high unemployment areas tend to be located nearest to downtown St. Paul, which has immensely high job density compared to the rest of the county. The only visible difference in the table is that workers in high unemployment areas are nearly twice as likely to commute more than 60 minutes. A similar pattern does not exist for commute distance.

Table 1. Distribution of Annual Pay

	< $15,000	**$15,000 - $40,000**	**> $40,000**
High Unemployment Areas	22.0%	39.4%	38.5%
All Ramsey County Workers	17.8%	30.8%	51.4%

Table 2. Distribution of Commute Distance

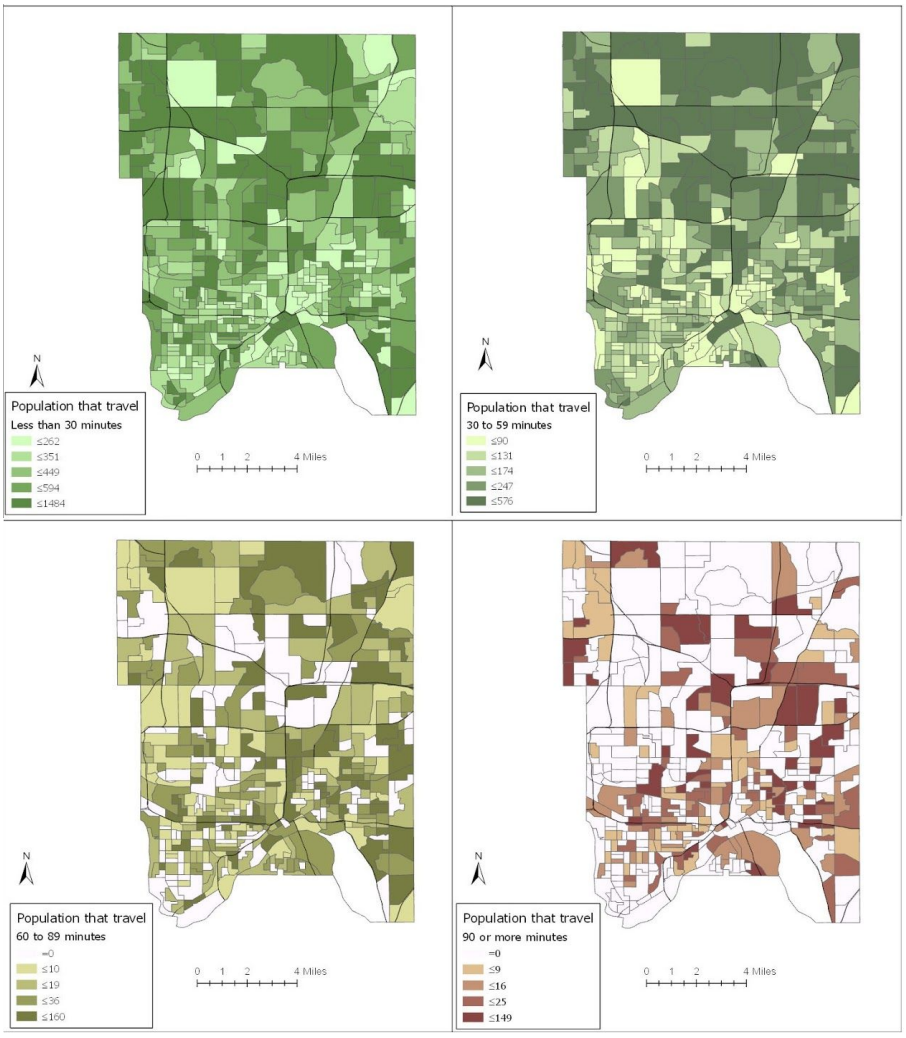
	< 10 miles	**10 - 25**	**25 - 50**	**50+**
High Unemployment Areas	66.8%	28.0%	1.7%	3.6%
All of Ramsey County	65.3%	29.5%	1.8%	3.4%

Table 3. Distribution of Commute Duration

	< 10 min	**10 - 20**	**20 - 30**	**30 - 45**	**45 - 60**	**60+**
High Unemployment Areas	7.7%	30.2%	24.9%	19.4%	5.5%	7.5%
All of Ramsey County	8.7%	30.2%	25.6%	20.3%	5.6%	4.2%

Because spatial mismatch is so intimately tied to commute time and distance, it would be helpful to see if there is a spatial pattern. Again, it would be intuitive if commute times were longest in the north part of the county, where land is mostly residential, and shortest in the city, where commerce dominates. However, as Figure 4 shows, this is not the case. The two maps at the top of the figure show the number of workers whose commute is less than 30 minutes and 30-60 minutes. The darker colors represent higher numbers of commuters. These darker colors on these first two maps are concentrated in the northern part of the county, showing that in fact workers in the suburbs are more likely to have a faster commute. The map on the bottom right shows the number of commuters who work more than 90 minutes away. Many suburban block groups have no commuters in this category, whereas the majority of block groups in the city of St. Paul have some moderate number of 90-minute commuters. The conclusion to be made from this is that commute time in fact has a higher upper-limit in the areas nearest the city than it does in the suburbs.

Figure 4. Travel Time To Work



The length of the worker's commute might be related to the sector of the worker's employment. To determine whether this is case, we construct dot density maps of employment in each sector (by worker residence). The breakdown of the employment sectors we are considering can be found in Table 4. Sectors are divided into more general classifications: primary for resource management, secondary for building and production, tertiary for human services, quaternary for science and technology.

Table 4. The Division of Employment Sectors

Industry Classification	**Employment Sectors**
Primary Industry	Agriculture, forestry, fishing and hunting
	Mining, quarrying, and oil and gas extraction
Secondary Industry	Construction
	Manufacturing
Tertiary Industry	Wholesale trade, Retail trade, Transportation, warehousing and utilities
	Finance, insurance, real estate, rental and leasing
	Educational services
	Health care and social assistance
	Arts, entertainment, recreation, accommodation and food services
	Other services and Public administration
Quaternary Industry	Information
	Professional, scientific, management, administrative and waste management services

The resulting maps appear in Figure 7. The block groups with the longest average commutes are outlined. It is not easy to see any spatial pattern among these block groups. Some are located in St. Paul, especially on the east side, while others are in the first- and second-ring suburbs. Because of this general lack of spatial trend, it is difficult to see in the maps which sectors tend to be more common in the outlined areas. Still, a few things can be learned here. For instance, Highland Park is home to the greatest concentration of workers in the Tertiary and Quaternary sectors, and none of the block groups there have long average commutes. Meanwhile, the greatest concentration of Secondary sector workers is found on the east side of St. Paul. Here quite a few of the block groups have more time-consuming commutes. If anything, we might conclude that these secondary industries - primarily manufacturing - require more travel than the tertiary and quaternary industries. The primary sector is not present in Ramsey County to any large extent.

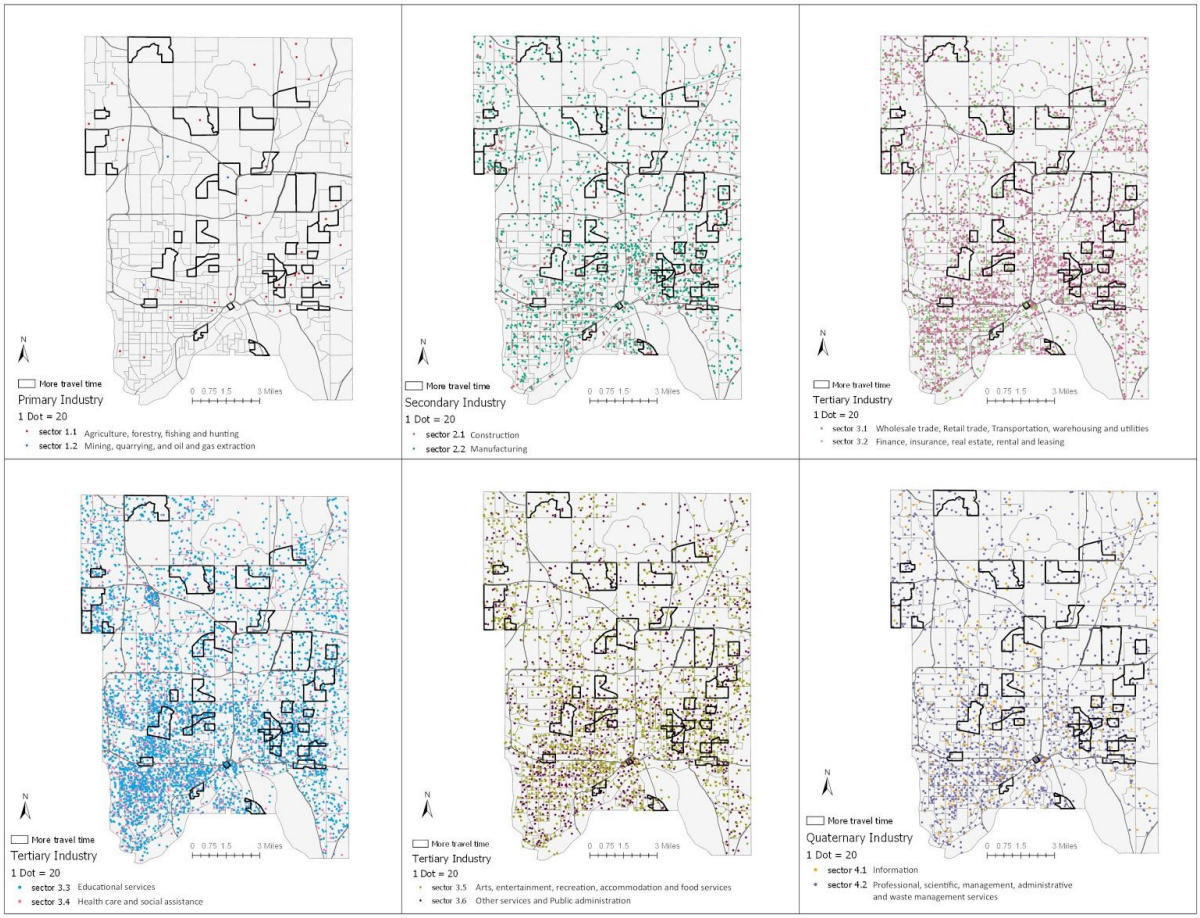


Figure 7. Employment Sectors vs. Travel Time

In fact, it may be easier to see this relationship between commute distance and job sector using a table than a map. Table 5 shows the proportion of workers in each of three extremely broad categories: goods production (1), trade, transport, and utilities (2), and all other workers (3). The first two categories together make up about 30% of the Ramsey County labor force. It is clear from the table that the first two categories tend to require a longer commute, with lower proportions of workers living 10 miles away from their jobs. This finding is consistent with the results of the maps in Figure 7.

Table 5. Commute Distance vs. Job Sectors

	<10 mi.	**10-24 mi.**	**25-50 mi.**	**>50 mi.**
Goods Production	53.5%	37.5%	3.6%	5.4%
Trade, Transport, Utilities	58.9%	33.5%	2.1%	5.5%
All Others	69.1%	26.8%	1.4%	2.7%

Another factor in commute distance might be income. Do workers who commute further make more money or less? Figure 8 answers this question by plotting median household income as color and average commute time as a circle of varying size. The spatial distribution of median household income is reminiscent of the poverty rate mapped in Figure 2. Some of the longest average commute times (the largest circles) are in the neighborhoods with the lowest median household incomes (the lighter colors). This is consistent with our previous findings, which had showed that the block groups closer to the urban core had a higher upper-limit of commute time than those in the suburbs (see Figure 4).

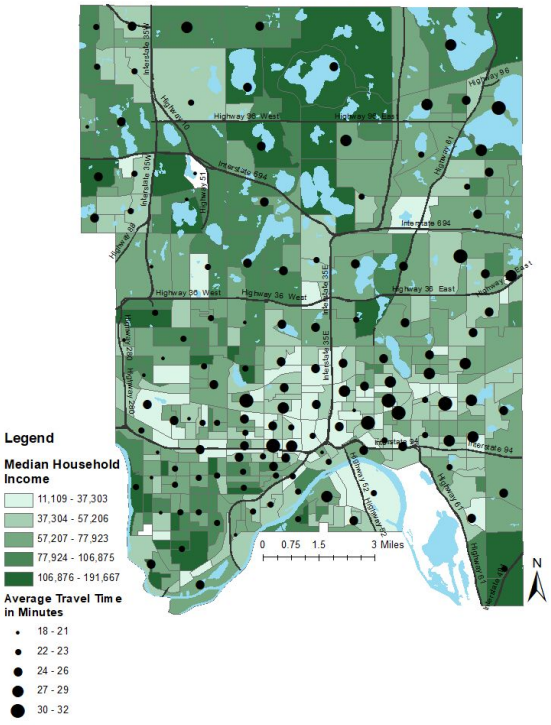


Figure 8. Median Household Income vs. Travel Time

Table 6 breaks down the relationship between worker income and commuting distance. We see that there is no clear relationship between worker income and distance traveled across the first three ranges of commute distance. However, there is clearly a relationship for the longest ranges of commuting. 1-in-20 workers in the lowest income group work more than 50 miles from home. Meanwhile, only 1-in-40 workers in the highest income group are in this situation. This result is consistent with those found in Table 3 and Figure 4. Lower-income workers have a higher upper-limit of commute length.

Table 6. Commute Time vs. Annual Pay

	<10 mi.	**10-24 mi.**	**25-50 mi.**	**>50 mi.**
< $15,000	66.7%	26.1%	2.0%	5.2%
$15,000 - $40,000	65.8%	28.6%	1.9%	3.8%
> $40,000	64.9%	30.8%	1.7%	2.6%

Finally, Figure 9 shows the distribution of workplaces within Ramsey County. As expected, the downtown area is packed with jobs, clusters of workplaces exist throughout St. Paul, and there are less jobs in the rest of the county. In general there are far more jobs in the block groups whose residents have lower median household incomes, and far less jobs in the areas whose residents have high household incomes. If economic decentralization has occurred in Ramsey County, it has not yet displaced this overall distribution of workplaces.

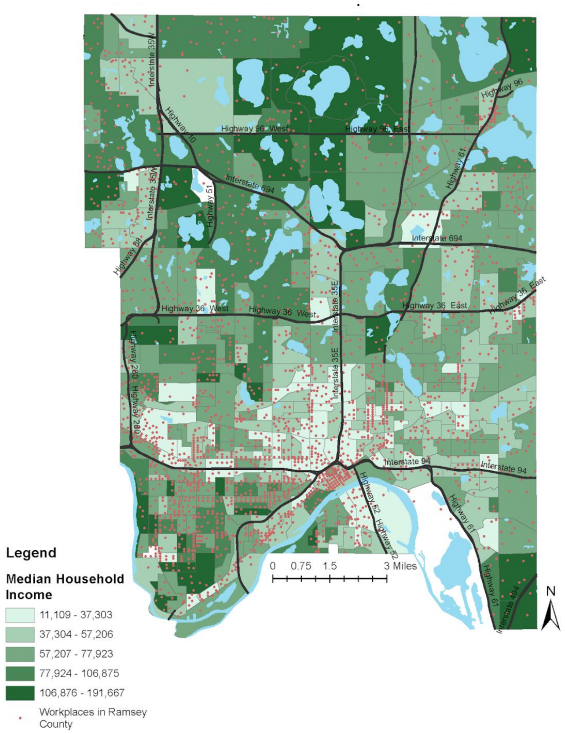


Figure 9. Median Household Income and Workplaces

Discussion

The spatial mismatch hypothesis posits that economic decentralization of the American metropolis has reinforced high unemployment rates in inner-city neighborhoods, which have lower mobility and higher poverty rates. We have found that in the case of Ramsey County, it is true that the neighborhoods with higher unemployment rates are mostly located within the core city of St. Paul, and that the households within these neighborhoods do tend to be poorer and less white, while also owning less vehicles, and having lower educational attainment. The spatial mismatch hypothesis is broadly correct, then, in its characterizations of high-unemployment neighborhoods.

Our research next tried to characterize the workers with the longest commutes. We found that the spatial distribution of commute times and distances is fairly similar across the county, although workers living in the core city and workers earning less money tend to have a higher upper limit for their commute times and distances. This finding is at odds with the fact that the core city is by far the place of the highest job density. Clearly these jobs are more likely to be occupied by those commuting in from other parts of the metro area. Finally, by breaking down workers by industrial sector, we found that workers in the

secondary sector (manufacturing) tend to have significantly longer commutes in both time and distance than those in the tertiary and quaternary sectors.

Our research was limited to an 'indirect' study of spatial mismatch, since we did not consider the distribution of job openings. We also limited ourselves to the scope of Ramsey County in all of our maps and tables. To get a complete picture of the patterns and trends associated with employment and commuting characteristics, it would be prudent to consider the metro area as a whole. Instead of focusing on finding correlations between neighborhoods, it would also be worthwhile to examine individual workers. A direct analysis at the individual level would be able to draw stronger conclusions than the more indirect, general analysis we have applied here. As far as individual employment data is concerned, we see great potential in studying the Center for Economic Studies' LODES dataset, which relates individual workers to work location, income, sector, commute distance, and age. We have used this dataset in our analysis, but we have not shown its true potential for comparison of different geographic areas. In which areas of the metro area do those who live in high-unemployment areas work? What neighborhoods are most dependent on manufacturing jobs? These are the sorts of questions that we leave to further research.

Reference

1. Janet Rothenberg Pack, Samara Potter, and William Gale. "The New Urban Economy: Opportunities and Challenges." *Conference Report* 7 (June 2001, Brookings Institution). https://www.brookings.edu/wp-content/uploads/2016/06/cr07.pdf
2. John F Kain. "The Spatial Mismatch Hypothesis: Three Decades Later." Housing Policy Debate vol. 3, no. 2(1992): 371-392.
3. ibid.
4. Judith K. Hellerstein, et al. "Spatial Mismatch or Racial Mismatch?" Journal of Urban Economics vol. 64 no. 2 (Sep. 2008): 464-479.
5. Yves Zenou, Laurent Gobillon, and Harris Selod. "The Mechanisms of Spatial Mismatch." Urban Studies vol. 44 no.12 (Nov. 2007): 2401-2427.
6. Steven Manson, Jonathan Schroeder, David Van Riper, and Steven Ruggles. IPUMS National Historical Geographic Information System: Version 13.0 [Database]. Minneapolis: University of Minnesota. 2018. http://doi.org/10.18128/D050.V13.0
7. Center for Economic Studies (US Census Bureau). *LEHD Origin-Destination Employment Statistics.* Available online https://www.census.gov/ces/dataproducts/lehddata.html. Last updated 2015.
8. Road and water shapefiles published by the State of Minnesota through www.gisdata.mn.gov. Updated regularly.